

$\omega(782)$

$I^G(J^{PC}) = 0^-(1^{--})$

$\omega(782)$ MASS

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
782.65 ± 0.12 OUR AVERAGE				Error includes scale factor of 1.9. See the ideogram below.
$783.20 \pm 0.13 \pm 0.16$	18680	AKHMETSHIN 05	CMD2	$0.60\text{--}1.38 e^+e^- \rightarrow \pi^0\gamma$
$782.68 \pm 0.09 \pm 0.04$	11200	¹ AKHMETSHIN 04	CMD2	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
$782.79 \pm 0.08 \pm 0.09$	1.2M	² ACHASOV 03D	RVUE	$0.44\text{--}2.00 e^+e^- \rightarrow \pi^+\pi^-\pi^0$
$782.7 \pm 0.1 \pm 1.5$	19500	WURZINGER 95	SPEC	$1.33 pd \rightarrow {}^3He\omega$
$781.96 \pm 0.17 \pm 0.80$	11k	³ AMSLER 94C	CBAR	$0.0 \bar{p}p \rightarrow \omega\eta\pi^0$
$782.08 \pm 0.36 \pm 0.82$	3463	⁴ AMSLER 94C	CBAR	$0.0 \bar{p}p \rightarrow \omega\eta\pi^0$
$781.96 \pm 0.13 \pm 0.17$	15k	AMSLER 93B	CBAR	$0.0 \bar{p}p \rightarrow \omega\pi^0\pi^0$
782.4 ± 0.2	270k	WEIDENAUER 93	ASTE	$\bar{p}p \rightarrow 2\pi^+2\pi^-\pi^0$
782.2 ± 0.4	1488	KURDADZE 83B	OLYA	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
782.4 ± 0.5	7000	⁵ KEYNE 76	CNTR	$\pi^-p \rightarrow \omega n$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
781.78 ± 0.10		⁶ BARKOV 87	CMD	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
783.3 ± 0.4	433	CORDIER 80	DM1	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
782.5 ± 0.8	33260	ROOS 80	RVUE	$0.0\text{--}3.6 \bar{p}p$
782.6 ± 0.8	3000	BENKHEIRI 79	OMEG	$9\text{--}12 \pi^\pm p$
781.8 ± 0.6	1430	COOPER 78B	HBC	$0.7\text{--}0.8 \bar{p}p \rightarrow 5\pi$
782.7 ± 0.9	535	VANAPEL...	HBC	$7.2 \bar{p}p \rightarrow \bar{p}p\omega$
783.5 ± 0.8	2100	GESSAROLI 77	HBC	$11 \pi^-p \rightarrow \omega n$
782.5 ± 0.8	418	AGUILAR-...	HBC	$3.9, 4.6 K^-p$
783.4 ± 1.0	248	BIZZARRI 71	HBC	$0.0 p\bar{p} \rightarrow K^+K^-\omega$
781.0 ± 0.6	510	BIZZARRI 71	HBC	$0.0 p\bar{p} \rightarrow K_1K_1\omega$
783.7 ± 1.0	3583	⁷ COYNE 71	HBC	$3.7 \pi^+p \rightarrow p\pi^+\pi^+\pi^-\pi^0$
784.1 ± 1.2	750	ABRAMOVI...	HBC	$3.9 \pi^-p$
783.2 ± 1.6		⁸ BIGGS 70B	CNTR	$<4.1 \gamma C \rightarrow \pi^+\pi^-C$
782.4 ± 0.5	2400	BIZZARRI 69	HBC	$0.0 \bar{p}p$

¹ Update of AKHMETSHIN 00C.

² From the combined fit of ANTONELLI 92, ACHASOV 01E, ACHASOV 02E, and ACHASOV 03D data on the $\pi^+\pi^-\pi^0$ and ANTONELLI 92 on the $\omega\pi^+\pi^-$ final states. Supersedes ACHASOV 99E and ACHASOV 02E.

³ From the $\eta \rightarrow \gamma\gamma$ decay.

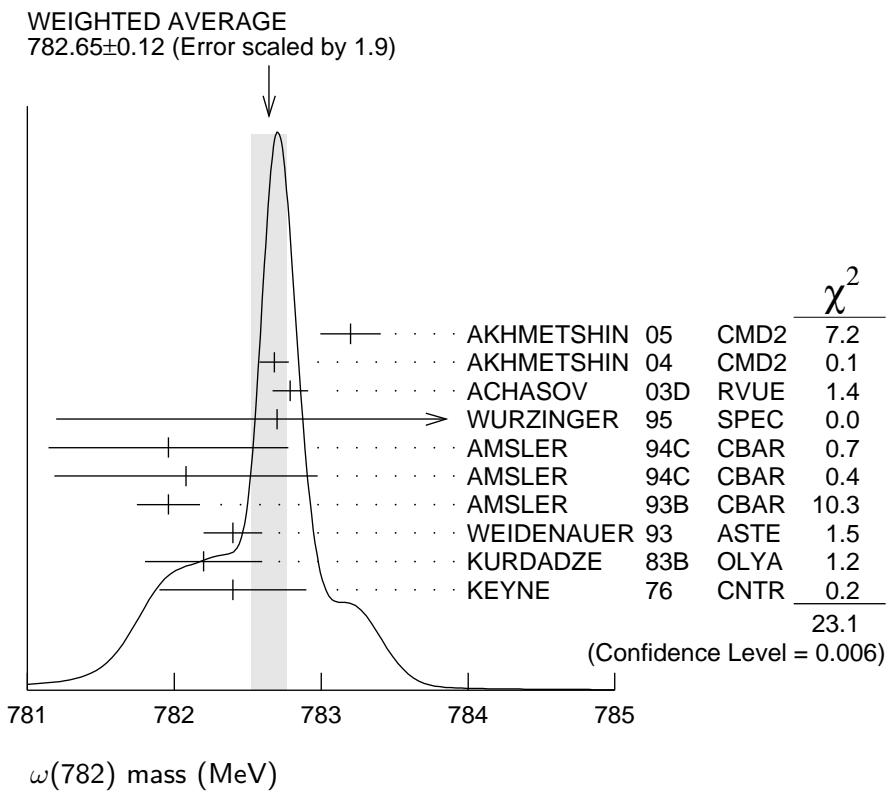
⁴ From the $\eta \rightarrow 3\pi^0$ decay.

⁵ Observed by threshold-crossing technique. Mass resolution = 4.8 MeV FWHM.

⁶ Systematic uncertainties underestimated.

⁷ From best-resolution sample of COYNE 71.

⁸ From ω - p interference in the $\pi^+\pi^-$ mass spectrum assuming ω width 12.6 MeV.



$\omega(782)$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
8.49±0.08 OUR AVERAGE				
8.68±0.23±0.10	11200	⁹ AKHMETSHIN 04	CMD2	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
8.68±0.04±0.15	1.2M	¹⁰ ACHASOV 03D	RVUE	$0.44^{+2.00}_{-0.44} e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
8.2 ± 0.3	19500	WURZINGER 95	SPEC	$1.33 p d \rightarrow {}^3He \omega$
8.4 ± 0.1		AULCHENKO 87	ND	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
8.30±0.40		BARKOV 87	CMD	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
9.8 ± 0.9	1488	KURDADZE 83B	OLYA	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
9.0 ± 0.8	433	CORDIER 80	DM1	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
9.1 ± 0.8	451	BENAKSAS 72B	OSPK	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
12 ± 2	1430	COOPER 78B	HBC	$0.7\text{--}0.8 \bar{p}p \rightarrow 5\pi$
9.4 ± 2.5	2100	GESSAROLI 77	HBC	$11 \pi^- p \rightarrow \omega n$
10.22±0.43	20000	¹² KEYNE 76	CNTR	$\pi^- p \rightarrow \omega n$
13.3 ± 2	418	AGUILAR-...	72B	HBC
10.5 ± 1.5		BORENSTEIN 72	HBC	$3.9, 4.6 K^- p$
7.70±0.9 ± 1.15	940	BROWN 72	MMS	$2.5 \pi^- p \rightarrow n \text{MM}$
10.3 ± 1.4	510	BIZZARRI 71	HBC	$0.0 p\bar{p} \rightarrow K_1 K_1 \omega$
12.8 ± 3.0	248	BIZZARRI 71	HBC	$0.0 p\bar{p} \rightarrow K^+ K^- \omega$
9.5 ± 1.0	3583	COYNE 71	HBC	$3.7 \pi^+ p \rightarrow p \pi^+ \pi^+ \pi^- \pi^0$

⁹ Update of AKHMETSHIN 00C.

¹⁰ From the combined fit of ANTONELLI 92, ACHASOV 01E, ACHASOV 02E, and ACHASOV 03D data on the $\pi^+ \pi^- \pi^0$ and ANTONELLI 92 on the $\omega \pi^+ \pi^-$ final states. Supersedes ACHASOV 99E and ACHASOV 02E.

¹¹ Relativistic Breit-Wigner includes radiative corrections.

¹² Observed by threshold-crossing technique. Mass resolution = 4.8 MeV FWHM.

$\omega(782)$ DECAY MODES

Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level
$\Gamma_1 \pi^+ \pi^- \pi^0$	(89.2 \pm 0.7) %	
$\Gamma_2 \pi^0 \gamma$	(8.91 \pm 0.24) %	S=1.1
$\Gamma_3 \pi^+ \pi^-$	(1.53 $^{+0.11}_{-0.13}$) %	S=1.2
Γ_4 neutrals (excluding $\pi^0 \gamma$)	(1.5 $^{+7.4}_{-1.0}$) $\times 10^{-3}$	
$\Gamma_5 \eta \gamma$	(4.8 \pm 0.4) $\times 10^{-4}$	S=1.1
$\Gamma_6 \pi^0 e^+ e^-$	(7.7 \pm 0.9) $\times 10^{-4}$	S=1.1
$\Gamma_7 \pi^0 \mu^+ \mu^-$	(9.6 \pm 2.3) $\times 10^{-5}$	
$\Gamma_8 \eta e^+ e^-$		
$\Gamma_9 e^+ e^-$	(7.17 \pm 0.12) $\times 10^{-5}$	S=1.1
$\Gamma_{10} \pi^+ \pi^- \pi^0 \pi^0$	< 2 %	CL=90%
$\Gamma_{11} \pi^+ \pi^- \gamma$	< 3.6 $\times 10^{-3}$	CL=95%
$\Gamma_{12} \pi^+ \pi^- \pi^+ \pi^-$	< 1 $\times 10^{-3}$	CL=90%
$\Gamma_{13} \pi^0 \pi^0 \gamma$	(6.7 \pm 1.1) $\times 10^{-5}$	
$\Gamma_{14} \eta \pi^0 \gamma$	< 3.3 $\times 10^{-5}$	CL=90%
$\Gamma_{15} \mu^+ \mu^-$	(9.0 \pm 3.1) $\times 10^{-5}$	
$\Gamma_{16} 3\gamma$	< 1.9 $\times 10^{-4}$	CL=95%

Charge conjugation (C) violating modes

$\Gamma_{17} \eta \pi^0$	$C < 1$	$\times 10^{-3}$	CL=90%
$\Gamma_{18} 3\pi^0$	$C < 3$	$\times 10^{-4}$	CL=90%

CONSTRAINED FIT INFORMATION

An overall fit to 15 branching ratios uses 48 measurements and one constraint to determine 10 parameters. The overall fit has a $\chi^2 = 34.6$ for 39 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\langle \delta x_i \delta x_j \rangle / (\delta x_i \cdot \delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i / \Gamma_{\text{total}}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_2	27								
x_3	-18	-5							
x_4	-93	-56	1						
x_5	8	10	-1	-10					
x_6	-1	0	0	0	0				
x_7	0	0	0	0	0	0			
x_9	-42	-53	8	53	-19	1	0		
x_{13}	1	3	0	-2	0	0	0	-2	
x_{15}	0	0	0	0	0	0	0	0	0
	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_9	x_{13}

$\omega(782)$ PARTIAL WIDTHS

$\Gamma(\pi^0\gamma)$

Γ_2

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
788 \pm 12 \pm 27	36500	¹³ ACHASOV	03	SND $e^+e^- \rightarrow \pi^0\gamma$
764 \pm 51	10625	DOLINSKY	89	ND $e^+e^- \rightarrow \pi^0\gamma$

¹³ Using $\Gamma_\omega = 8.44 \pm 0.09$ MeV and $B(\omega \rightarrow \pi^0\gamma)$ from ACHASOV 03.

$\Gamma(\eta\gamma)$

Γ_5

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
6.1 \pm 2.5		¹⁴ DOLINSKY	89	ND $e^+e^- \rightarrow \eta\gamma$

¹⁴ Using $\Gamma_\omega = 8.4 \pm 0.1$ MeV and $B(\omega \rightarrow \eta\gamma)$ from DOLINSKY 89.

$\Gamma(e^+e^-)$

Γ_9

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.60 \pm 0.02 OUR EVALUATION				

• • • We do not use the following data for averages, fits, limits, etc. **• • •**

0.591 \pm 0.015	11200	^{15,16} AKHMETSHIN 04	CMD2	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
0.653 \pm 0.003 \pm 0.021	1.2M	¹⁷ ACHASOV	03D	RVUE $e^+e^- \rightarrow \pi^+\pi^-\pi^0$
0.600 \pm 0.031	10625	DOLINSKY	89	ND $e^+e^- \rightarrow \pi^0\gamma$

¹⁵ Using $B(\omega \rightarrow \pi^+\pi^-\pi^0) = 0.891 \pm 0.007$ and $\Gamma_{\text{total}} = 8.44 \pm 0.09$ MeV.

¹⁶ Update of AKHMETSHIN 00C.

¹⁷ Using ACHASOV 03, ACHASOV 03D and $B(\omega \rightarrow \pi^+\pi^-) = (1.70 \pm 0.28)\%$.

$\omega(782) \Gamma(e^+ e^-) \Gamma(i)/\Gamma^2(\text{total})$

$$\Gamma(e^+ e^-) \times \Gamma(\pi^+ \pi^- \pi^0)/\Gamma_{\text{total}}^2 \quad \Gamma_9 \Gamma_1/\Gamma^2$$

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
--------------------------	------	-------------	------	---------

6.39±0.10 OUR FIT Error includes scale factor of 1.1.

6.38±0.10 OUR AVERAGE Error includes scale factor of 1.1.

$6.24 \pm 0.11 \pm 0.08$	11.2k	18 AKHMETSHIN 04	CMD2	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
$6.70 \pm 0.06 \pm 0.27$		AUBERT,B	04N BABR	$10.6 e^+ e^- \rightarrow \pi^+ \pi^- \pi^0 \gamma$
$6.74 \pm 0.04 \pm 0.24$	1.2M	19,20 ACHASOV	03D RVUE	$0.44-2.00 e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
6.37 ± 0.35		19 DOLINSKY	89 ND	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
6.45 ± 0.24		19 BARKOV	87 CMD	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
5.79 ± 0.42	1488	19 KURDADZE	83B OLYA	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
5.89 ± 0.54	433	19 CORDIER	80 DM1	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
7.54 ± 0.84	451	19 BENAKSAS	72B OSPK	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$

18 Update of AKHMETSHIN 00C.

19 Recalculated by us from the cross section in the peak.

20 From the combined fit of ANTONELLI 92, ACHASOV 01E, ACHASOV 02E, and ACHASOV 03D data on the $\pi^+ \pi^- \pi^0$ and ANTONELLI 92 on the $\omega \pi^+ \pi^-$ final states. Supersedes ACHASOV 99E and ACHASOV 02E.

$$\Gamma(e^+ e^-) \times \Gamma(\pi^0 \gamma)/\Gamma_{\text{total}}^2 \quad \Gamma_9 \Gamma_2/\Gamma^2$$

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
--------------------------	------	-------------	------	---------

6.39±0.15 OUR FIT

6.45±0.17 OUR AVERAGE

$6.47 \pm 0.14 \pm 0.39$	18680	AKHMETSHIN 05	CMD2	$0.60-1.38 e^+ e^- \rightarrow \pi^0 \gamma$
$6.50 \pm 0.11 \pm 0.20$	36500	21 ACHASOV 03	SND	$0.60-0.97 e^+ e^- \rightarrow \pi^0 \gamma$
$6.34 \pm 0.21 \pm 0.21$	10625	22 DOLINSKY	89 ND	$e^+ e^- \rightarrow \pi^0 \gamma$

21 Using $\sigma_{\phi \rightarrow \pi^0 \gamma}$ from ACHASOV 00 and $m_\omega = 782.57$ MeV in the model with the energy-independent phase of ρ - ω interference equal to $(-10.2 \pm 7.0)^\circ$.

22 Recalculated by us from the cross section in the peak.

$$\Gamma(e^+ e^-) \times \Gamma(\pi^+ \pi^-)/\Gamma_{\text{total}}^2 \quad \Gamma_9 \Gamma_3/\Gamma^2$$

VALUE (units 10^{-6})	EVTS	DOCUMENT ID	TECN	COMMENT
--------------------------	------	-------------	------	---------

1.225±0.058±0.041 800k 23 ACHASOV 06 SND $e^+ e^- \rightarrow \pi^+ \pi^-$

23 Supersedes ACHASOV 05A.

$$\Gamma(e^+ e^-) \times \Gamma(\eta \gamma)/\Gamma_{\text{total}}^2 \quad \Gamma_9 \Gamma_5/\Gamma^2$$

VALUE (units 10^{-8})	EVTS	DOCUMENT ID	TECN	COMMENT
--------------------------	------	-------------	------	---------

3.47±0.29 OUR FIT Error includes scale factor of 1.1.

3.35±0.28 OUR AVERAGE

$3.33 \pm 0.33 \pm 0.07$	33k	24 ACHASOV 06A	SND	$e^+ e^- \rightarrow \eta \gamma$
$3.17^{+1.85}_{-1.31} \pm 0.21$	17.4k	25 AKHMETSHIN 05	CMD2	$0.60-1.38 e^+ e^- \rightarrow \eta \gamma$
$3.41 \pm 0.52 \pm 0.21$	23k	26,27 AKHMETSHIN 01B	CMD2	$e^+ e^- \rightarrow \eta \gamma$

- ²⁴ From a combined fit of $\sigma(e^+e^- \rightarrow \eta\gamma)$ with $\eta \rightarrow 3\pi^0$ and $\eta \rightarrow \pi^+\pi^-\pi^0$, and fixing $B(\eta \rightarrow 3\pi^0)/B(\eta \rightarrow \pi^+\pi^-\pi^0) = 1.44 \pm 0.04$. Supersedes ACHASOV 00D. Recalculated by us from the cross section at the peak.
- ²⁵ From the $\eta \rightarrow 2\gamma$ decay and using $B(\eta \rightarrow \gamma\gamma) = 39.43 \pm 0.26\%$.
- ²⁶ From the $\eta \rightarrow 3\pi^0$ decay and using $B(\eta \rightarrow 3\pi^0) = (32.24 \pm 0.29) \times 10^{-2}$.
- ²⁷ The combined fit from 600 to 1380 MeV taking into account $\rho(770)$, $\omega(782)$, $\phi(1020)$, and $\rho(1450)$ (mass and width fixed at 1450 MeV and 310 MeV respectively).

$\omega(782)$ BRANCHING RATIOS

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	Γ_1/Γ
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$					
$0.8965 \pm 0.0016 \pm 0.0048$	1.2M	28,29	ACHASOV 03D	RVUE	$0.44-2.00 e^+e^- \rightarrow \pi^+\pi^-\pi^0$
$0.880 \pm 0.020 \pm 0.032$	11200	29,30	AKHMETSHIN 00C	CMD2	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
0.8942 ± 0.0062		29	DOLINSKY 89	ND	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
²⁸ Using ACHASOV 03, ACHASOV 03D and $B(\omega \rightarrow \pi^+\pi^-) = (1.70 \pm 0.28)\%$.					
²⁹ Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}^2$.					
³⁰ Using $\Gamma(e^+e^-) = 0.60 \pm 0.02$ keV.					

$\Gamma(\pi^0\gamma)/\Gamma_{\text{total}}$

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT	Γ_2/Γ
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$					
$9.06 \pm 0.20 \pm 0.57$	18680	31,32	AKHMETSHIN 05	CMD2	$0.60-1.38 e^+e^- \rightarrow \pi^0\gamma$
$9.34 \pm 0.15 \pm 0.31$	36500	32	ACHASOV 03	SND	$0.60-0.97 e^+e^- \rightarrow \pi^0\gamma$
$8.65 \pm 0.16 \pm 0.42$	1.2M	33,34	ACHASOV 03D	RVUE	$0.44-2.00 e^+e^- \rightarrow \pi^+\pi^-\pi^0$
8.39 ± 0.24	9975	35	BENAYOUN 96	RVUE	$e^+e^- \rightarrow \pi^0\gamma$
8.88 ± 0.62	10625	32	DOLINSKY 89	ND	$e^+e^- \rightarrow \pi^0\gamma$
³¹ Using $B(\omega \rightarrow e^+e^-) = (7.14 \pm 0.13) \times 10^{-5}$.					
³² Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\pi^0\gamma)/\Gamma_{\text{total}}^2$.					
³³ Using ACHASOV 03, ACHASOV 03D and $B(\omega \rightarrow \pi^+\pi^-) = (1.70 \pm 0.28)\%$.					
³⁴ Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}^2$.					
³⁵ Reanalysis of DRUZHININ 84, DOLINSKY 89, DOLINSKY 91 taking into account the triangle anomaly contributions.					

$\Gamma(\pi^0\gamma)/\Gamma(\pi^+\pi^-\pi^0)$

VALUE (units 10^{-2})	DOCUMENT ID	TECN	COMMENT	Γ_2/Γ_1
9.99 ± 0.26 OUR FIT	Error includes scale factor of 1.1.			
9.7 ± 0.5 OUR AVERAGE				
$9.94 \pm 0.36 \pm 0.38$	36 AULCHENKO 00A	SND	$e^+e^- \rightarrow \pi^+\pi^-\pi^0\pi^0, \pi^0\pi^0\gamma$	
8.4 ± 1.3	KEYNE 76	CNTR	$\pi^-p \rightarrow \omega n$	
10.9 ± 2.5	BENAKSAS 72C	OSPK	$e^+e^- \rightarrow \pi^0\gamma$	
8.1 ± 2.0	BALDIN 71	HLBC	$2.9\pi^+p$	
13 ± 4	JACQUET 69B	HLBC	$2.05\pi^+p \rightarrow \pi^+p\omega$	
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
$9.7 \pm 0.2 \pm 0.5$	37,38 ACHASOV 03D	RVUE	$0.44-2.00 e^+e^- \rightarrow \pi^+\pi^-\pi^0$	
9.9 ± 0.7	37 DOLINSKY 89	ND	$e^+e^- \rightarrow \pi^0\gamma$	

36 From $\sigma_0^{\omega\pi^0} \rightarrow \pi^0\pi^0\gamma(m_\phi)/\sigma_0^{\omega\pi^0} \rightarrow \pi^+\pi^-\pi^0\pi^0(m_\phi)$ with a phase-space correction factor of 1/1.023.

37 Not independent of the corresponding $\Gamma(e^+e^-) \times \Gamma(\pi^0\gamma)/\Gamma_{\text{total}}^2$.

38 Using ACHASOV 03. Based on 1.2M events.

$\Gamma(\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_3/Γ

See also $\Gamma(\pi^+\pi^-)/\Gamma(\pi^+\pi^-\pi^0)$.

VALUE (units 10^{-2})	EVTS	DOCUMENT ID	TECN	COMMENT
--------------------------	------	-------------	------	---------

1.53^{+0.11}_{-0.13} OUR FIT Error includes scale factor of 1.2.

1.49^{+0.13}_{-0.13} OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below.

1.46 ± 0.12 ± 0.02	900k	³⁹ AKHMETSHIN 07	$e^+e^- \rightarrow \pi^+\pi^-$	■
1.30 ± 0.24 ± 0.05	11.2k	⁴⁰ AKHMETSHIN 04	CMD2 $e^+e^- \rightarrow \pi^+\pi^-$	
2.38 ^{+1.77} _{-0.90} ± 0.18	5.4k	⁴¹ ACHASOV 02E	SND $1.1-1.38 e^+e^- \rightarrow \pi^+\pi^-\pi^0$	
2.3 ± 0.5		BARKOV 85	OLYA $e^+e^- \rightarrow \pi^+\pi^-$	
1.6 ^{+0.9} _{-0.7}		QUENZER 78	DM1 $e^+e^- \rightarrow \pi^+\pi^-$	
3.6 ± 1.9		BENAKSAS 72	OSPK $e^+e^- \rightarrow \pi^+\pi^-$	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.75 ± 0.11	4.5M	⁴² ACHASOV 05A	SND $e^+e^- \rightarrow \pi^+\pi^-$	
2.01 ± 0.29		⁴³ BENAYOUN 03	RVUE $e^+e^- \rightarrow \pi^+\pi^-$	
1.9 ± 0.3		⁴⁴ GARDNER 99	RVUE $e^+e^- \rightarrow \pi^+\pi^-$	
2.3 ± 0.4		⁴⁵ BENAYOUN 98	RVUE $e^+e^- \rightarrow \pi^+\pi^-, \mu^+\mu^-$	
1.0 ± 0.11		⁴⁶ WICKLUND 78	ASPK $3,4,6 \pi^\pm N$	
1.22 ± 0.30		ALVENSLEB... 71C	CNTR Photoproduction	
1.3 ^{+1.2} _{-0.9}		MOFFEIT 71	HBC $2.8,4.7 \gamma p$	
0.80 ^{+0.28} _{-0.20}		⁴⁷ BIGGS 70B	CNTR $4.2\gamma C \rightarrow \pi^+\pi^- C$	

³⁹ A combined fit of AKHMETSHIN 07, AULCHENKO 06, and AULCHENKO 05.

⁴⁰ Update of AKHMETSHIN 02.

⁴¹ From the $m_{\pi^+\pi^-}$ spectrum taking into account the interference of the $\rho\pi$ and $\omega\pi$ amplitudes.

⁴² Using $\Gamma(\omega \rightarrow e^+e^-)$ from the 2004 Edition of this Review (PDG 04).

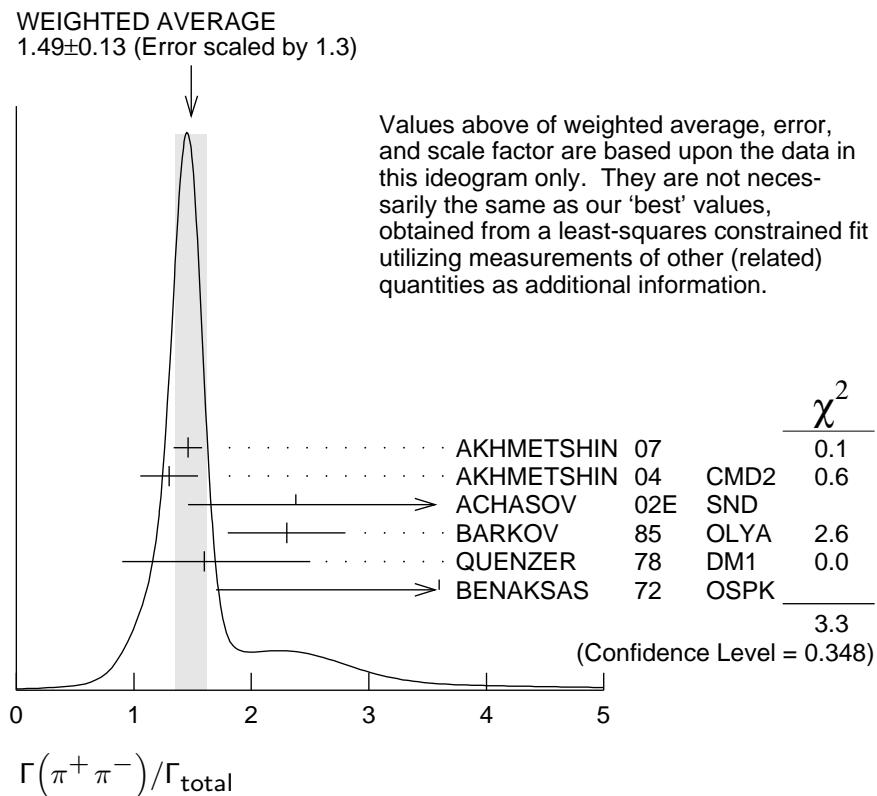
⁴³ Using the data of AKHMETSHIN 02 in the hidden local symmetry model.

⁴⁴ Using the data of BARKOV 85.

⁴⁵ Using the data of BARKOV 85 in the hidden local symmetry model.

⁴⁶ From a model-dependent analysis assuming complete coherence.

⁴⁷ Re-evaluated under $\Gamma(\pi^+\pi^-)/\Gamma(\pi^+\pi^-\pi^0)$ by BEHREND 71 using more accurate $\omega \rightarrow \rho$ photoproduction cross-section ratio.



$$\Gamma(\pi^+ \pi^-)/\Gamma(\pi^+ \pi^- \pi^0)$$

See also $\Gamma(\pi^+ \pi^-)/\Gamma_{\text{total}}$.

$$\Gamma_3/\Gamma$$

$$\Gamma_3/\Gamma_1$$

0.0172±0.0014 OUR FIT Error includes scale factor of 1.2.

0.026 ±0.005 OUR AVERAGE

VALUE		DOCUMENT ID	TECN	COMMENT
0.021	+0.028 -0.009	48,49 RATCLIFF	72 ASPK	15 $\pi^- p \rightarrow n 2\pi$
0.028	±0.006	48 BEHREND	71 ASPK	Photoproduction
0.022	+0.009 -0.01	50 ROOS	70 RVUE	

⁴⁸ The fitted width of these data is 160 MeV in agreement with present average, thus the ω contribution is overestimated. Assuming ρ width 145 MeV.

⁴⁹ Significant interference effect observed. NB of $\omega \rightarrow 3\pi$ comes from an extrapolation.

⁵⁰ ROOS 70 combines ABRAMOVICH 70 and BIZZARRI 70.

$$\Gamma(\pi^+ \pi^-)/\Gamma(\pi^0 \gamma)$$

$$\Gamma_3/\Gamma_2$$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.20±0.04	1.98M	51 ALOISIO	03 KLOE	$1.02 e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$

⁵¹ Using the data of ALOISIO 02D.

$\Gamma(\text{ neutrals})/\Gamma_{\text{total}}$

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$(\Gamma_2+\Gamma_4)/\Gamma$
0.091 ± 0.006 OUR FIT					
0.081 ± 0.011 OUR AVERAGE					
0.075 \pm 0.025		BIZZARRI	71	HBC 0.0 $p\bar{p}$	
0.079 \pm 0.019		DEINET	69B	OSPK 1.5 $\pi^- p$	
0.084 \pm 0.015		BOLLINI	68C	CNTR 2.1 $\pi^- p$	
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$					
0.073 \pm 0.018	42	BASILE	72B	CNTR 1.67 $\pi^- p$	

$\Gamma(\text{ neutrals})/\Gamma(\pi^+ \pi^- \pi^0)$

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$(\Gamma_2+\Gamma_4)/\Gamma_1$
0.102 ± 0.008 OUR FIT					
$0.103^{+0.011}_{-0.010}$ OUR AVERAGE					
0.15 \pm 0.04	46	AGUILAR-...	72B	HBC 3.9,4.6 $K^- p$	
0.10 \pm 0.03	19	BARASH	67B	HBC 0.0 $\bar{p}p$	
0.134 \pm 0.026	850	DIGIUGNO	66B	CNTR 1.4 $\pi^- p$	
0.097 \pm 0.016	348	FLATTE	66	HBC 1.4 – 1.7 $K^- p \rightarrow \Lambda MM$	
0.06 $^{+0.05}_{-0.02}$		JAMES	66	HBC 2.1 $\pi^+ p$	
0.08 \pm 0.03	35	KRAEMER	64	DBC 1.2 $\pi^+ d$	
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$					
0.11 \pm 0.02	20	BUSCHBECK	63	HBC 1.5 $K^- p$	

$\Gamma(\pi^0 \gamma)/\Gamma(\text{ neutrals})$

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$\Gamma_2/(\Gamma_2+\Gamma_4)$
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$					
0.78 \pm 0.07		⁵² DAKIN	72	OSPK 1.4 $\pi^- p \rightarrow n MM$	
>0.81	90	DEINET	69B	OSPK	
52 Error statistical only. Authors obtain good fit also assuming $\pi^0 \gamma$ as the only neutral decay.					

$\Gamma(\text{ neutrals})/\Gamma(\text{ charged particles})$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$(\Gamma_2+\Gamma_4)/(\Gamma_1+\Gamma_3)$
0.100 ± 0.008 OUR FIT				
0.124 ± 0.021		FELDMAN	67C	OSPK 1.2 $\pi^- p$

$\Gamma(\eta\gamma)/\Gamma_{\text{total}}$

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	Γ_5/Γ
4.8 ± 0.4 OUR FIT				Error includes scale factor of 1.1.	
6.3 ± 1.3 OUR AVERAGE				Error includes scale factor of 1.2.	
6.6 \pm 1.7		⁵³ ABELE	97E	CBAR 0.0 $\bar{p}p \rightarrow 5\gamma$	
8.3 \pm 2.1		ALDE	93	GAM2 $38\pi^- p \rightarrow \omega n$	
3.0 $^{+2.5}_{-1.8}$		⁵⁴ ANDREWS	77	CNTR 6.7–10 γCu	

• • • We do not use the following data for averages, fits, limits, etc. • • •

$4.63 \pm 0.46 \pm 0.13$	33k	⁵⁵ ACHASOV	06A	SND	$e^+ e^- \rightarrow \eta\gamma$	■
$4.44^{+2.59}_{-1.83} \pm 0.28$	17.4k	^{56,57} AKHMETSHIN 05	CMD2	0.60-1.38	$e^+ e^- \rightarrow \eta\gamma$	■
$5.10 \pm 0.72 \pm 0.34$	23k	⁵⁸ AKHMETSHIN 01B	CMD2	$e^+ e^- \rightarrow \eta\gamma$		
0.7 to 5.5		⁵⁹ CASE	00	CBAR	$0.0 p\bar{p} \rightarrow \eta\eta\gamma$	
$6.56^{+2.41}_{-2.55}$	3525	^{54,60} BENAYOUN	96	RVUE	$e^+ e^- \rightarrow \eta\gamma$	
7.3 ± 2.9		^{54,56} DOLINSKY	89	ND	$e^+ e^- \rightarrow \eta\gamma$	

53 No flat $\eta\eta\gamma$ background assumed.

54 Solution corresponding to constructive ω - ρ interference.

55 Using $B(\omega \rightarrow e^+ e^-) = (7.14 \pm 0.13) \times 10^{-5}$.

56 Not independent of the corresponding $\Gamma(e^+ e^-) \times \Gamma(\eta\gamma)/\Gamma_{\text{total}}^2$.

57 Using $B(\omega \rightarrow e^+ e^-) = (7.14 \pm 0.13) \times 10^{-5}$ and $B(\eta \rightarrow \gamma\gamma) = 39.43 \pm 0.26\%$.

58 Using $B(\omega \rightarrow e^+ e^-) = (7.07 \pm 0.19) \times 10^{-5}$ and using $B(\eta \rightarrow 3\pi^0) = (32.24 \pm 0.29) \times 10^{-2}$. Solution corresponding to constructive ω - ρ interference. The combined fit from 600 to 1380 MeV taking into account $\rho(770)$, $\omega(782)$, $\phi(1020)$, and $\rho(1450)$ (mass and width fixed at 1450 MeV and 310 MeV respectively). Not independent of the corresponding $\Gamma(e^+ e^-) \times \Gamma(\eta\gamma)/\Gamma_{\text{total}}^2$.

59 Depending on the degree of coherence with the flat $\eta\eta\gamma$ background and using $B(\omega \rightarrow \pi^0 \gamma) = (8.5 \pm 0.5) \times 10^{-2}$.

60 Reanalysis of DRUZHININ 84, DOLINSKY 89, DOLINSKY 91 taking into account the triangle anomaly contributions.

$\Gamma(\eta\gamma)/\Gamma(\pi^0\gamma)$

Γ_5/Γ_2

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.0098 ± 0.0024	⁶¹ ALDE	93	GAM2 $38\pi^- p \rightarrow \omega n$
0.0082 ± 0.0033	⁶² DOLINSKY	89	ND $e^+ e^- \rightarrow \eta\gamma$
0.010 ± 0.045	APEL	72B	OSPK 4-8 $\pi^- p \rightarrow n3\gamma$

61 Model independent determination.

62 Solution corresponding to constructive ω - ρ interference.

$\Gamma(\pi^0 e^+ e^-)/\Gamma_{\text{total}}$

Γ_6/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
7.7 ± 0.9 OUR FIT				Error includes scale factor of 1.1.
7.7 ± 0.9 OUR AVERAGE				Error includes scale factor of 1.1.

8.19 ± 0.71 ± 0.62

AKHMETSHIN 05A CMD2 0.72-0.84 $e^+ e^-$

5.9 ± 1.9

43 DOLINSKY 88 ND $e^+ e^- \rightarrow \pi^0 e^+ e^-$

$\Gamma(\pi^0 \mu^+ \mu^-)/\Gamma_{\text{total}}$

Γ_7/Γ

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
0.96 ± 0.23 OUR FIT			
0.96 ± 0.23	DZHELYADIN 81B CNTR	25-33	$\pi^- p \rightarrow \omega n$

$\Gamma(\eta e^+ e^-)/\Gamma_{\text{total}}$

Γ_8/Γ

VALUE (units 10^{-5})	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
<1.1	AKHMETSHIN 05A	CMD2	0.72-0.84 $e^+ e^-$

$\Gamma(e^+ e^-)/\Gamma_{\text{total}}$

Γ_9/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
0.717 ± 0.012 OUR FIT	Error includes scale factor of 1.1.			
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
0.700 ± 0.016	11200	63,64 AKHMETSHIN 04	CMD2	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.752 ± 0.004 ± 0.024	1.2M	64,65 ACHASOV 03D	RVUE	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.714 ± 0.036	64 DOLINSKY	89 ND		$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.72 ± 0.03	64 BARKOV	87 CMD		$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.64 ± 0.04	1488 KURDADZE	83B OLYA		$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.675 ± 0.069	433 CORDIER	80 DM1		$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.83 ± 0.10	451 BENAKSAS	72B OSPK		$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.77 ± 0.06	66 AUGUSTIN	69D OSPK		$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$
0.65 ± 0.13	33 ASTVACAT...	68 OSPK		Assume SU(3)+mixing

63 Using $B(\omega \rightarrow \pi^+ \pi^- \pi^0) = 0.891 \pm 0.007$. Update of AKHMETSHIN 00C.

64 Not independent of the corresponding $\Gamma(e^+ e^-) \times \Gamma(\pi^+ \pi^- \pi^0)/\Gamma_{\text{total}}^2$.

65 Using ACHASOV 03, ACHASOV 03D and $B(\omega \rightarrow \pi^+ \pi^-) = (1.70 \pm 0.28)\%$.

66 Rescaled by us to correspond to ω width 8.4 MeV. Systematic errors underestimated.

67 Not resolved from ρ decay. Error statistical only.

$\Gamma(\pi^+ \pi^- \pi^0 \pi^0)/\Gamma_{\text{total}}$

Γ_{10}/Γ

VALUE (units 10^{-2})	CL%	DOCUMENT ID	TECN	COMMENT
<2	90	KURDADZE 86	OLYA	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^0 \pi^0$

$\Gamma(\pi^+ \pi^- \gamma)/\Gamma_{\text{total}}$

Γ_{11}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.0036	95	WEIDENAUER 90	ASTE	$p\bar{p} \rightarrow \pi^+ \pi^- \pi^+ \pi^- \gamma$
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
<0.004	95	BITYUKOV 88B	SPEC	$32 \pi^- p \rightarrow \pi^+ \pi^- \gamma X$

$\Gamma(\pi^+ \pi^- \gamma)/\Gamma(\pi^+ \pi^- \pi^0)$

Γ_{11}/Γ_1

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
<0.066	90	KALBFLEISCH 75	HBC	$2.18 K^- p \rightarrow \Lambda \pi^+ \pi^- \gamma$
<0.05	90	FLATTE 66	HBC	$1.2 - 1.7 K^- p \rightarrow \Lambda \pi^+ \pi^- \gamma$

$\Gamma(\pi^+ \pi^- \pi^+ \pi^-)/\Gamma_{\text{total}}$

Γ_{12}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<1 × 10⁻³	90	KURDADZE 88	OLYA	$e^+ e^- \rightarrow \pi^+ \pi^- \pi^+ \pi^-$

$\Gamma(\pi^0\pi^0\gamma)/\Gamma_{\text{total}}$ Γ_{13}/Γ

<u>VALUE (units 10^{-5})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
6.7 ± 1.1 OUR FIT				
6.5 ± 1.2 OUR AVERAGE				

$6.4^{+2.4}_{-2.0} \pm 0.8$ 190 ⁶⁸ AKHMETSHIN 04B CMD2 0.6–0.97 $e^+e^- \rightarrow \pi^0\pi^0\gamma$

$6.6^{+1.4}_{-1.3} \pm 0.6$ 295 ACHASOV 02F SND $0.36\text{--}0.97 e^+e^- \rightarrow \pi^0\pi^0\gamma$

• • • We do not use the following data for averages, fits, limits, etc. • • •

$11.8^{+2.1}_{-1.9} \pm 1.4$ 190 ⁶⁹ AKHMETSHIN 04B CMD2 0.6–0.97 $e^+e^- \rightarrow \pi^0\pi^0\gamma$

$7.8 \pm 2.7 \pm 2.0$ 63 ^{68,70} ACHASOV 00G SND $e^+e^- \rightarrow \pi^0\pi^0\gamma$

$12.7 \pm 2.3 \pm 2.5$ 63 ^{69,70} ACHASOV 00G SND $e^+e^- \rightarrow \pi^0\pi^0\gamma$

⁶⁸ In the model assuming the $\rho \rightarrow \pi^0\pi^0\gamma$ decay via the $\omega\pi$ and $f_0(600)\gamma$ mechanisms.

⁶⁹ In the model assuming the $\rho \rightarrow \pi^0\pi^0\gamma$ decay via the $\omega\pi$ mechanism only.

⁷⁰ Superseded by ACHASOV 02F.

 $\Gamma(\pi^0\pi^0\gamma)/\Gamma(\pi^+\pi^-\pi^0)$ Γ_{13}/Γ_1

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.00045	90	DOLINSKY	89	$e^+e^- \rightarrow \pi^0\pi^0\gamma$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.08 95 JACQUET 69B HLBC $2.05 \pi^+ p \rightarrow \pi^+ p\omega$

 $\Gamma(\pi^0\pi^0\gamma)/\Gamma(\pi^0\gamma)$ Γ_{13}/Γ_2

<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
7.6 ± 1.3 OUR FIT					

8.5 ± 2.9 40 ± 14 ALDE 94B GAM2 $38\pi^- p \rightarrow \pi^0\pi^0\gamma n$

• • • We do not use the following data for averages, fits, limits, etc. • • •

< 50 90 DOLINSKY 89 ND $e^+e^- \rightarrow \pi^0\pi^0\gamma$

<1800 95 KEYNE 76 CNTR $\pi^- p \rightarrow \omega n$

<1500 90 BENAKSAS 72C OSPK e^+e^-

<1400 DOLINSKY 71 HLBC $2.9 \pi^+ p$

<1000 90 BARMIN 64 HLBC $1.3\text{--}2.8 \pi^- p$

 $\Gamma(\pi^0\pi^0\gamma)/\Gamma(\text{ neutrals})$ $\Gamma_{13}/(\Gamma_2 + \Gamma_4)$

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
--------------	------------	--------------------	-------------	----------------

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.22 ± 0.07 71 DAKIN 72 OSPK $1.4 \pi^- p \rightarrow n\text{MM}$

<0.19 90 DEINET 69B OSPK

⁷¹ See $\Gamma(\pi^0\gamma)/\Gamma(\text{ neutrals})$.

 $\Gamma(\eta\pi^0\gamma)/\Gamma_{\text{total}}$ Γ_{14}/Γ

<u>VALUE (units 10^{-5})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<3.3	90	AKHMETSHIN 04B	CMD2	$0.6\text{--}0.97 e^+e^- \rightarrow \eta\pi^0\gamma$

$\Gamma(\mu^+\mu^-)/\Gamma_{\text{total}}$

<u>VALUE</u> (units 10^{-5})	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
9.0 ± 3.1 OUR FIT				
$9.0 \pm 2.9 \pm 1.1$	18	HEISTER	02C ALEP	$Z \rightarrow \mu^+\mu^- + X$

Γ_{15}/Γ

$\Gamma(\mu^+\mu^-)/\Gamma(\pi^+\pi^-\pi^0)$

<u>VALUE</u> (units 10^{-3})	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.2	90	WILSON	69 OSPK	$12 \pi^- C \rightarrow Fe$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<1.7	74	FLATTE	66 HBC	$1.2 - 1.7 K^- p \rightarrow \Lambda \mu^+ \mu^-$
<1.2		BARBARO-...	65 HBC	$2.7 K^- p$

Γ_{15}/Γ_1

$\Gamma(\pi^0\mu^+\mu^-)/\Gamma(\mu^+\mu^-)$

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.2 ± 0.6	30	⁷² DZHELYADIN	79 CNTR	$25-33 \pi^- p$

⁷² Superseded by DZHELYADIN 81B result above.

Γ_7/Γ_{15}

$\Gamma(3\gamma)/\Gamma_{\text{total}}$

<u>VALUE</u> (units 10^{-4})	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<1.9	95	⁷³ ABELE	97E CBAR	$0.0 \bar{p}p \rightarrow 5\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<2	90	⁷³ PROKOSHKIN	95 GAM2	$38 \pi^- p \rightarrow 3\gamma n$

⁷³ From direct 3γ decay search.

Γ_{16}/Γ

$\Gamma(\eta\pi^0)/\Gamma_{\text{total}}$

Violates C conservation.

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.001	90	ALDE	94B GAM2	$38\pi^- p \rightarrow \eta\pi^0 n$

Γ_{17}/Γ

$[\Gamma(\eta\gamma) + \Gamma(\eta\pi^0)]/\Gamma(\pi^+\pi^-\pi^0)$

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.016	90	⁷⁴ FLATTE	66 HBC	$1.2 - 1.7 K^- p \rightarrow \Lambda\pi^+\pi^- MM$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.045	95	JACQUET	69B HLBC	$2.05 \pi^+ p \rightarrow \pi^+ p\omega$

⁷⁴ Restated by us using $B(\eta \rightarrow \text{charged modes}) = 29.2\%$.

$(\Gamma_5 + \Gamma_{17})/\Gamma_1$

$\Gamma(3\pi^0)/\Gamma_{\text{total}}$

Violates C conservation.

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.0003	90	PROKOSHKIN	95 GAM2	$38\pi^- p \rightarrow 3\pi^0 n$

Γ_{18}/Γ

$\Gamma(3\pi^0)/\Gamma(\pi^+\pi^-\pi^0)$

Violates C conservation.

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •			
<0.009	90	BARBERIS	01 450 $pp \rightarrow p_f 3\pi^0 p_s$

Γ_{18}/Γ_1

$\omega(782)$ REFERENCES

AKHMETSHIN	07	PL B648 28	R. Akhmetshin <i>et al.</i>	(Novosibirsk CMD-2 Collab.)
ACHASOV	06	JETP 103 380	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)
		Translated from ZETF 130 437.		
ACHASOV	06A	PR D74 014016	M.N. Achasov <i>et al.</i>	(SND Collab.)
AULCHENKO	06	JETPL 84 413	V.M. Aulchenko <i>et al.</i>	(Novosibirsk CMD-2 Collab.)
		Translated from ZETFP 84 491.		
ACHASOV	05A	JETP 101 1053	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)
		Translated from ZETF 128 1201.		
AKHMETSHIN	05	PL B605 26	R.R. Akhmetshin <i>et al.</i>	(Novosibirsk CMD-2 Collab.)
AKHMETSHIN	05A	PL B613 29	R.R. Akhmetshin <i>et al.</i>	(Novosibirsk CMD-2 Collab.)
AULCHENKO	05	JETPL 82 743	V.M. Aulchenko <i>et al.</i>	(Novosibirsk CMD-2 Collab.)
		Translated from ZETFP 82 841.		
AKHMETSHIN	04	PL B578 285	R.R. Akhmetshin <i>et al.</i>	(Novosibirsk CMD-2 Collab.)
AKHMETSHIN	04B	PL B580 119	R.R. Akhmetshin <i>et al.</i>	(Novosibirsk CMD-2 Collab.)
AUBERT,B	04N	PR D70 072004	B. Aubert <i>et al.</i>	(BABAR Collab.)
PDG	04	PL B592 1	S. Eidelman <i>et al.</i>	
ACHASOV	03	PL B559 171	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)
ACHASOV	03D	PR D68 052006	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)
ALOISIO	03	PL B561 55	A. Aloisio <i>et al.</i>	(KLOE Collab.)
BENAYOUN	03	EPJ C29 397	M. Benayoun <i>et al.</i>	
ACHASOV	02E	PR D66 032001	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)
ACHASOV	02F	PL B537 201	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)
AKHMETSHIN	02	PL B527 161	R.R. Akhmetshin <i>et al.</i>	(Novosibirsk CMD-2 Collab.)
ALOISIO	02D	PL B537 21	A. Aloisio <i>et al.</i>	(KLOE Collab.)
HEISTER	02C	PL B528 19	A. Heister <i>et al.</i>	(ALEPH Collab.)
ACHASOV	01E	PR D63 072002	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)
AKHMETSHIN	01B	PL B509 217	R.R. Akhmetshin <i>et al.</i>	(Novosibirsk CMD-2 Collab.)
BARBERIS	01	PL B507 14	D. Barberis <i>et al.</i>	
ACHASOV	00	EPJ C12 25	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)
ACHASOV	00D	JETPL 72 282	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)
		Translated from ZETFP 72 411.		
ACHASOV	00G	JETPL 71 355	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)
		Translated from ZETFP 71 519.		
AKHMETSHIN	00C	PL B476 33	R.R. Akhmetshin <i>et al.</i>	(Novosibirsk CMD-2 Collab.)
AULCHENKO	00A	JETP 90 927	V.M. Aulchenko <i>et al.</i>	(Novosibirsk SND Collab.)
		Translated from ZETF 117 1067.		
CASE	00	PR D61 032002	T. Case <i>et al.</i>	(Crystal Barrel Collab.)
ACHASOV	99E	PL B462 365	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)
GARDNER	99	PR D59 076002	S. Gardner, H.B. O'Connell	
BENAYOUN	98	EPJ C2 269	M. Benayoun <i>et al.</i>	(IPNP, NOVO, ADLD+)
ABELE	97E	PL B411 361	A. Abele <i>et al.</i>	(Crystal Barrel Collab.)
BENAYOUN	96	ZPHY C72 221	M. Benayoun <i>et al.</i>	(IPNP, NOVO)
PROKOSHKIN	95	SPD 40 273	Y.D. Prokoshkin, V.D. Samoilenko	(SERP)
		Translated from DANS 342 610.		
WURZINGER	95	PR C51 443	R. Wurzinger <i>et al.</i>	(BONN, ORSAY, SACL+)
ALDE	94B	PL B340 122	D.M. Alde <i>et al.</i>	(SERP, BELG, LANL, LAPP+)
AMSLER	94C	PL B327 425	C. Amsler <i>et al.</i>	(Crystal Barrel Collab.)
ALDE	93	PAN 56 1229	D.M. Alde <i>et al.</i>	(SERP, LAPP, LANL, BELG+)
Also		Translated from YAF 56 137.		
AMSLER	93B	PL B311 362	D.M. Alde <i>et al.</i>	(SERP, LAPP, LANL, BELG+)
WEIDENAUER	93	ZPHY C59 387	C. Amsler <i>et al.</i>	(Crystal Barrel Collab.)
ANTONELLI	92	ZPHY C56 15	P. Weidenauer <i>et al.</i>	(ASTERIX Collab.)
DOLINSKY	91	PRPL 202 99	A. Antonelli <i>et al.</i>	(DM2 Collab.)
WEIDENAUER	90	ZPHY C47 353	S.I. Dolinsky <i>et al.</i>	(NOVO)
DOLINSKY	89	ZPHY C42 511	P. Weidenauer <i>et al.</i>	(ASTERIX Collab.)
BITYUKOV	88B	SJNP 47 800	S.I. Dolinsky <i>et al.</i>	(NOVO)
DOLINSKY	88	Translated from YAF 47 1258.	S.I. Bityukov <i>et al.</i>	(SERP)
		SJNP 48 277		
		Translated from YAF 48 442.		
KURDADZE	88	JETPL 47 512	S.I. Dolinsky <i>et al.</i>	(NOVO)
		Translated from ZETFP 47 432.		
AULCHENKO	87	PL B186 432	L.M. Kurdadze <i>et al.</i>	(NOVO)
BARKOV	87	JETPL 46 164	V.M. Aulchenko <i>et al.</i>	(NOVO)
		Translated from ZETFP 46 132.		
KURDADZE	86	JETPL 43 643	L.M. Kurdadze <i>et al.</i>	(NOVO)
		Translated from ZETFP 43 497.		
BARKOV	85	NP B256 365	L.M. Barkov <i>et al.</i>	(NOVO)
DRUZHININ	84	PL 144B 136	V.P. Druzhinin <i>et al.</i>	(NOVO)
KURDADZE	83B	JETPL 36 274	A.M. Kurdadze <i>et al.</i>	(NOVO)
		Translated from ZETFP 36 221.		

DZHELYADIN	81B	PL 102B 296	R.I. Dzhelyadin <i>et al.</i>	(SERP)
CORDIER	80	NP B172 13	A. Cordier <i>et al.</i>	(LALO)
ROOS	80	LNC 27 321	M. Roos, A. Pellinen	(HELS)
BENKHEIRI	79	NP B150 268	P. Benkheiri <i>et al.</i>	(EPOL, CERN, CDEF+)
DZHELYADIN	79	PL 84B 143	R.I. Dzhelyadin <i>et al.</i>	(SERP)
COOPER	78B	NP B146 1	A.M. Cooper <i>et al.</i>	(TATA, CERN, CDEF+)
QUENZER	78	PL 76B 512	A. Quenzer <i>et al.</i>	(LALO)
VANAPEL...	78	NP B133 245	G.W. van Apeldoorn <i>et al.</i>	(ZEEM)
WICKLUND	78	PR D17 1197	A.B. Wicklund <i>et al.</i>	(ANL)
ANDREWS	77	PRL 38 198	D.E. Andrews <i>et al.</i>	(ROCH)
GESSAROLI	77	NP B126 382	R. Gessaroli <i>et al.</i>	(BGNA, FIRZ, GENO+)
KEYNE	76	PR D14 28	J. Keyne <i>et al.</i>	(LOIC, SHMP)
Also		PR D8 2789	D.M. Binnie <i>et al.</i>	(LOIC, SHMP)
KALBFLEISCH	75	PR D11 987	G.R. Kalbfleisch, R.C. Strand, J.W. Chapman	(BNL+)
AGUILAR-...	72B	PR D6 29	M. Aguilar-Benitez <i>et al.</i>	(BNL)
APEL	72B	PL 41B 234	W.D. Apel <i>et al.</i>	(KARLK, KARLE, PISA)
BASILE	72B	Phil. Conf. 153	M. Basile <i>et al.</i>	(CERN)
BENAKSAS	72	PL 39B 289	D. Benakasas <i>et al.</i>	(ORSAY)
BENAKSAS	72B	PL 42B 507	D. Benakasas <i>et al.</i>	(ORSAY)
BENAKSAS	72C	PL 42B 511	D. Benakasas <i>et al.</i>	(ORSAY)
BORENSTEIN	72	PR D5 1559	S.R. Borenstein <i>et al.</i>	(BNL, MICH)
BROWN	72	PL 42B 117	R.M. Brown <i>et al.</i>	(ILL, ILLC)
DAKIN	72	PR D6 2321	J.T. Dakin <i>et al.</i>	(PRIN)
RATCLIFF	72	PL 38B 345	B.N. Ratcliff <i>et al.</i>	(SLAC)
ALVENSLEB...	71C	PRL 27 888	H. Alvensleben <i>et al.</i>	(DESY)
BALDIN	71	SJNP 13 758	A.B. Baldin <i>et al.</i>	(ITEP)
		Translated from YAF 13	1318.	
BEHREND	71	PRL 27 61	H.J. Behrend <i>et al.</i>	(ROCH, CORN, FNAL)
BIZZARRI	71	NP B27 140	R. Bizzarri <i>et al.</i>	(CERN, CDEF)
COYNE	71	NP B32 333	D.G. Coyne <i>et al.</i>	(LRL)
MOFFEIT	71	NP B29 349	K.C. Moffeit <i>et al.</i>	(LRL, UCB, SLAC+)
ABRAMOV...	70	NP B20 209	M. Abramovich <i>et al.</i>	(CERN)
BIGGS	70B	PRL 24 1201	P.J. Biggs <i>et al.</i>	(DARE)
BIZZARRI	70	PRL 25 1385	R. Bizzarri <i>et al.</i>	(ROMA, SYRA)
ROOS	70	DNPL/R7 173	M. Roos	(CERN)
Proc. Daresbury Study Weekend No. 1.				
AUGUSTIN	69D	PL 28B 513	J.E. Augustin <i>et al.</i>	(ORSAY)
BIZZARRI	69	NP B14 169	R. Bizzarri <i>et al.</i>	(CERN, CDEF)
DEINET	69B	PL 30B 426	W. Deinet <i>et al.</i>	(KARL, CERN)
JACQUET	69B	NC 63A 743	F. Jacquet <i>et al.</i>	(EPOL, BERG)
WILSON	69	Private Comm.	R. Wilson	(HARV)
Also		PR 178 2095	A.A. Wehmann <i>et al.</i>	(HARV, CASE, SLAC+)
ASTVACAT...	68	PL 27B 45	R.G. Astvatsaturov <i>et al.</i>	(JINR, MOSU)
BOLLINI	68C	NC 56A 531	D. Bollini <i>et al.</i>	(CERN, BGNA, STRB)
BARASH	67B	PR 156 1399	N. Barash <i>et al.</i>	(COLU)
FELDMAN	67C	PR 159 1219	M. Feldman <i>et al.</i>	(PENN)
DIGUGNO	66B	NC 44A 1272	G. Di Giugno <i>et al.</i>	(NAPL, FRAS, TRST)
FLATTE	66	PR 145 1050	S.M. Flatte <i>et al.</i>	(LRL)
JAMES	66	PR 142 896	F.E. James, H.L. Kraybill	(YALE, BNL)
BARBARO-...	65	PRL 14 279	A. Barbaro-Galtieri, R.D. Tripp	(LRL)
BARMIN	64	JETP 18 1289	V.V. Barmin <i>et al.</i>	(ITEP)
		Translated from ZETF 45	1879.	
KRAEMER	64	PR 136B 496	R.W. Kraemer <i>et al.</i>	(JHU, NWES, WOOD)
BUSCHBECK	63	Siena Conf. 1 166	B. Buschbeck <i>et al.</i>	(VIEN, CERN, ANIK)

OTHER RELATED PAPERS

AZIMOV	03	EPJ A16 209	Ya.I. Aximov	
BENAYOUN	01	EPJ C22 503	M. Benayoun, H.B. O'Connell	
GOKALP	01B	EPJ C22 327	A. Gokalp, Y. Sarac, O. Yilmaz	
DELBOURGO	99B	PR D59 113006	R. Delbourgo <i>et al.</i>	
GARDNER	98	PR D57 2716	S. Gardner, H.B. O'Connell	
Also		PR D62 019903 (erratum)	S. Gardner, H.B. O'Connell	
ABELE	97F	PL B411 354	A. Abele <i>et al.</i>	(Crystal Barrel Collab.)
DOLINSKY	86	PL B174 453	S.I. Dolinsky <i>et al.</i>	(NOVO)
KURDADZE	83	JETPL 37 733	L.M. Kurdadze <i>et al.</i>	(NOVO)
		Translated from ZETFP 37	613.	

ALFF-...	62B	PRL 9 325	C. Alff-Steinberger <i>et al.</i>	(COLU, RUTG)
STEVENSON	62	PR 125 687	M.L. Stevenson <i>et al.</i>	(LRL)
MAGLICH	61	PRL 7 178	B.C. Maglich <i>et al.</i>	(LRL)
PEVSNER	61	PRL 7 421	A. Pevsner <i>et al.</i>	(JHU)
XUONG	61	PRL 7 327	H. Nguyen Ngoc, G.R. Lynch	(LRL)
